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ROLE OF AGROTECHNOLOGIES IN CONSERVATION OF MEDICINAL PLANTS

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ABSTRACT

Medicinal plant conservation is a national issue today. The reason behind the plant extinction is exploitation of the medicinal plants for commercial usage. The population of the plant is very less when compared to market need. So to prevent the plant from extinction there are only two ways, increasing the population of the plants or enhancing the phyto-constituents of the plants, to reach the needy targets. These two objectives can be achieved through agro-technologies like Tissue culture, Biotechnology, Bio-fertilizers, Elemental fertilizers etc.

Keywords: Agro-technology, Tissue culture, Medicinal plant conservation

INTRODUCTION

Agro-technology is the technology of agriculture, the methods or machinery needed for efficient production. Herbal medicine field is growing drastically. Current world is becoming more and more dependent on Ayurveda and herbal medicines. Everyday a new herbal product is coming up to the market as medicine, nutraceutical or cosmeceutical. By this a drastic demand is created for medicinal plants. Source for these plants are forests. To reach the market need, people are exploiting forests. By which many plants are extinct. Some became rare; few endangered or threatened like,

Pterocrpus santalinus (Red sandalwood), Chlorophytum tuberosum (Musli) Kingiodendron pinnatum (Malabar mahagony) etc. Solution for this is quick multiplication of the plants, their yield and phyto-constituents, to suffice the demand. Contribution of agro-technologies towards medicinal plants conservation has to be thought of.

MATERIALS AND METHODS

Agrotechnologies:

1. Tissue culture:[2]

Plant tissue culture relies on the fact that many plant cells have the ability to regenerate a whole plant (totipotency) Single cells, plant cells without cell walls (protoplasts), pieces of leaves, stems or roots can often be used to generate a new plant on culture media given the required nutrients and plant hormones.

Plant tissue culture is a collection of techniques used to maintain or grow plant cells, tissues or organs under sterile conditions on a nutrient culture medium of known composition. Plant tissue culture is widely used to produce clones of a plant in a method known as micro-propagation. Different techniques in plant tissue culture may offer certain advantages over traditional methods of propagation, including:

- The production of exact copies of plants that produce particularly good flowers, fruits, or have other desirable traits.
- To produce mature plants quickly.
- The production of multiples of plants in the absence of seeds or necessary pollinators to produce seeds.
- The regeneration of whole plants from plant cells that have been genetically modified.

2. Biotechnology:[3]

Biotechnology is the use of living systems and organisms to develop or make products, or "any technological application that uses biological systems, living organisms or derivatives thereof, to make or modify products or processes for specific use".

In biotechnology a particular gene can be deleted from the DNA of a plant which is in need and a needed gene can be introduced. Through this phyto-constituents of a plant can be enhanced.

Green biotechnology: is biotechnology applied to agricultural processes. An example would be the selection and domestication of plants via micro-propagation. Another example is the designing of transgenic plants to grow under specific environments in the presence (or absence) of chemicals. One hope is that green biotechnology might produce more environmental friendly solutions than traditional industrial agriculture. An example of this is the engineering of a plant to express a pesticide, thereby ending the need of external application of pesticides.

3. Biofertilisers:[4]

Here micro-organisms are used as fertilizers, like Arbuscular mycorrhizal fungi[5]. These fungi first colonise themselves in the plant root and then they enhance the nutrient uptaking capacity of the plant. This increases the phyto-constituent yield of a plant.

4. Elemental fertilisers:[6]

Here fine particles of a particular element are used as fertilizer. For example, fine particles of iron are used as fertilizer for a plant in which iron is a trace element. This enhances the iron content of that plant.

OBSERVATION

Plant tissue culture is helpful in medicinal plant conservation in following ways:

- The commercial production of plants, which uses meristem and shoot culture to produce large numbers of identical individuals.
- To conserve rare or endangered plant species.
- A plant breeder may use tissue culture to screen cells rather than plants for advantageous characters, e.g. herbicide resistance/tolerance.
- Large-scale growth of plant cells in liquid culture in bioreactors for production of valuable compounds, like plant-derived secondary metabolites and recombinant proteins used as biopharmaceuticals.
- To cross distantly related species by protoplast fusion and regeneration of the novel hybrid. Bio-fertilizers and Elemental fertilizers have a definite role in enhancing phyto-constituents of a plant.

DISCUSSION

Bio-fertilizers and Elemental fertilizers can enhance the phyto-constituents of a plant but not the population of the plant, where as tissue culture and biotechnology can achieve the both.

Bio-fertilisers are cheaper when compared to chemical fertilisers. If some amount of bio-fertiliser is mixed with normal soil, the micro-organism present in it will convert the whole soil as bio-fertiliser. So one can prepare the bio-fertiliser in their home itself.
Biotechnology, Tissue culture and Elemental fertilisers are costlier than chemical fertilisers.
Agro-technologies are safe when compared to chemical fertilizers, as it causes toxicity.
Government of India has made schemes to implement biotechnology in medicinal plant cultivation and thereby conservation. [7]
All the four techniques are helpful to achieve the goal of preserving the medicinal plants from rare, endangered, threatened and extinct.

CONCLUSION

Tissue culture helps in increasing the number of plants and plant products. Biotechnology helps in introducing a new quality and deleting an unwanted quality from the plant. Bio-fertilizers and Elemental fertilizers help in increasing the phyto-constituents of a plant. Agro-technologies are safe when compared to chemical fertilizers. Thus agro-technologies have a great role in medicinal plant conservation.

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